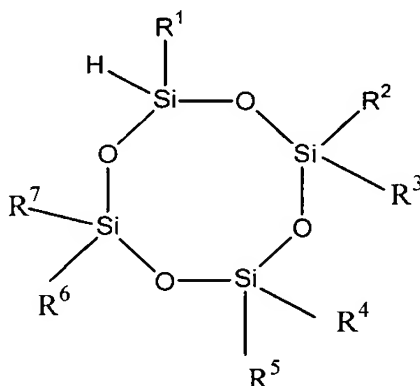


CLAIMS

1. A process for stabilizing a cyclotetrasiloxane against polymerization used in a chemical vapor deposition process for silicon oxides in electronic material fabrication, comprising; providing an effective amount of a neutral to weakly acidic polymerization inhibitor to said cyclotetrasiloxane having the following formula:



where R^{1-7} are individually selected from the group consisting of hydrogen, a normal, branched or cyclic C_{1-10} alkyl group, and a C_{1-4} alkoxy group.

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2. The process of Claim 1 wherein said inhibitor has a pKa of 4.8 to 14.15.

3. The process of Claim 1 wherein said inhibitor is selected from the group consisting of 2,4-pentanedione; 1-hexanoic acid; glycerol; acetic anhydride; less than 1% (vol.) 1,1,1,5,5,5-hexamethyltrisiloxane; less than 1% (vol.) 1,1,1,3,5,5,5-heptamethyltrisiloxane; β -diketones $RC(O)CH_2C(O)R$; aliphatic carboxylic acids $RCOOH$; aliphatic dicarboxylic acids $HOOC-(CH_2)_n - COOH$ in which $1 \leq n \leq 8$; phenols $C_6R_{(6-n)}(OH)_n$ in which $1 \leq n \leq 5$; polyols $CH_2X(CHX)_nCH_2X$, in which $X = H$ or OH but at least one $X = OH$ and $1 \leq n \leq 8$; anhydrides $RCH_2-C(O)-O-C(O)-CH_2R$; hydrosiloxanes $R_3Si-(O-SiR_2)_n-OSiR_3$, in which $0 \leq n \leq 8$, all wherein R is individually selected from the group consisting of hydrogen, normal, branched or cyclic C_{1-10} alkyl groups; and mixtures thereof.

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4. The process of Claim 1 including providing a free radical scavenger to said cyclotetrasiloxane.

5. The process of Claim 4 wherein said free radical scavenger is selected from the group consisting of: 2,6-di-tert-butyl-4-methyl phenol, 2,2,6,6-tetramethyl-1-piperidinyloxy, 2-tert-butyl-4-hydroxyanisole, 3-tert-butyl-4-hydroxyanisole, propyl ester 3,4,5-trihydroxy-benzoic acid, 2-(1,1-dimethylethyl)-1,4-benzenediol, diphenylpicrylhydrazyl, 4-tert-butylcatechol, N-methylaniline, p-methoxydiphenylamine, diphenylamine, N,N'-diphenyl-p-phenylenediamine, p-hydroxydiphenylamine, phenol, octadecyl-3-(3,5-di-tert-butyl-4-hydroxyphenyl) propionate, tetrakis (methylene (3,5-di-tert-butyl)-4-hydroxy-hydrocinnamate) methane, phenothiazines, alkylamidonoisoureas, thiodiethylene bis (3,5-di-tert-butyl-4-hydroxy-hydrocinnamate, 1,2,-bis (3,5-di-tert-butyl-4-hydroxyhydrocinnamoyl) hydrazine, tris (2-methyl-4-hydroxy-5-tert-butylphenyl) butane, cyclic neopentanetetrayl bis (octadecyl phosphite), 4,4'-thiobis (6-tert-butyl-m-cresol), 2,2'-methylenebis (6-tert-butyl-p-cresol), oxalyl bis (benzylidenehydrazide) and mixtures thereof.

6. The process of Claim 5 wherein said 2,6-di-tert-butyl-4-methyl phenol is provided in an amount of 50-500 ppm (vol.).

7. The process of Claim 5 wherein said 2,2,6,6-tetramethyl-1-piperidinyloxy is provided in an amount of 50-230 ppm (vol.).

8. A process for stabilizing 1,3,5,7-tetramethylcyclotetrasiloxane against polymerization used in a chemical vapor deposition process for silicon oxides in electronic material fabrication comprising providing an effective amount of a neutral to weakly acidic polymerization inhibitor to said 1,3,5,7-tetramethylcyclotetrasiloxane.

9. The process of Claim 8 wherein said inhibitor has a pKa of 4.8 to 14.15.

5 10. The process of Claim 8 wherein said inhibitor is selected from the group consisting of 2,4-pentanedione, 1-hexanoic acid, glycerol, acetic anhydride, less than 1% (vol.) 1,1,1,5,5,5-hexamethyltrisiloxane, less than 1% (vol.) 1,1,1,3,5,5,5-heptamethyltrisiloxane and mixtures thereof.

10 11. The process of Claim 8 including providing a free radical scavenger to said 1,3,5,7-tetramethylcyclotetrasiloxane.

12. The process of Claim 11 wherein said free radical scavenger is selected from the group consisting of 2,6-di-tert-butyl-4-methyl phenol, 2,2,6,6-tetramethyl-1-piperidinyloxy and mixtures thereof.

15 13. The process of Claim 12 wherein said scavenger is provided in an amount of 50-500 ppm (vol.).

20 14. The process of Claim 12 wherein said 2,2,6,6-tetramethyl-1-piperidinyloxy is provided in an amount of 50-230 ppm (vol.).

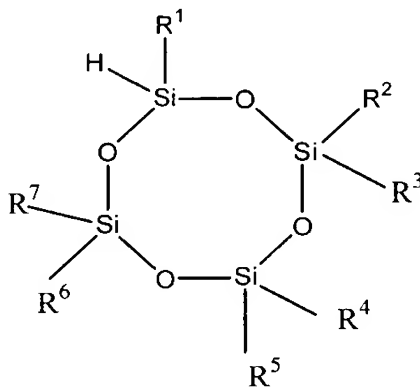
25 15. A process for stabilizing 1,3,5,7-tetramethylcyclotetrasiloxane against polymerization used in a chemical vapor deposition process for silicon oxides in electronic material fabrication comprising providing a neutral to weakly acidic polymerization inhibitor to said 1,3,5,7-tetramethylcyclotetrasiloxane and providing a free radical scavenger to said 1,3,5,7-tetramethylcyclotetrasiloxane.

30 16. The process of Claim 15 wherein said inhibitor is selected from the group consisting of 2,4-pentanedione, 1-hexanoic acid, glycerol, acetic anhydride, less than 1% (vol.) 1,1,1,5,5,5-hexamethyltrisiloxane and mixtures thereof.

17. The process of Claim 15 wherein said free radical scavenger is selected from the group consisting of 2,6-di-tert-butyl-4-methyl phenol, 2,2,6,6-tetramethyl-1-piperidinyloxy and mixtures thereof.

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18. A composition of a cyclotetrasiloxane stabilizing against polymerization used in a chemical vapor deposition process for silicon oxides in electronic material fabrication, comprising; (a) said cyclotetrasiloxane having the following formula:



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where R¹⁻⁷ are individually selected from the group consisting of hydrogen, a normal, branched or cyclic C₁₋₁₀ alkyl group, and a C₁₋₄ alkoxy group, and (b) a neutral to weakly acidic polymerization inhibitor.

15 19. A composition of 1,3,5,7-tetramethylcyclotetrasiloxane stabilized against polymerization used in a chemical vapor deposition process as a precursor for silicon oxides in electronic material fabrication comprising 1,3,5,7-tetramethylcyclotetrasiloxane and a neutral to weakly acidic polymerization inhibitor.

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20. A composition of 1,3,5,7-tetramethylcyclotetrasiloxane, used in a chemical vapor deposition process as a precursor for silicon oxides in electronic material fabrication, stabilized against polymerization, comprising 1,3,5,7-

tetramethylcyclotetrasiloxane and a neutral to weakly acidic polymerization inhibitor and a free radical scavenger.

21. A composition of 1,3,5,7-tetramethylcyclotetrasiloxane, used in a chemical vapor deposition process as a precursor for silicon oxides in electronic material fabrication, stabilized against polymerization, comprising (a) 1,3,5,7-tetramethylcyclotetrasiloxane, (b) a neutral to weakly acidic polymerization inhibitor selected from the group consisting of 2,4-pentanedione; 1-hexanoic acid; glycerol; acetic anhydride; less than 1% (vol.) 1,1,1,5,5,5-hexamethyltrisiloxane; less than 1% (vol.) 1,1,1,3,5,5,5-heptamethyltrisiloxane; β -diketones $RC(O)CH_2C(O)R$; aliphatic carboxylic acids $RCOOH$; aliphatic dicarboxylic acids $HOOC-(CH_2)_n-COOH$ in which $1 \leq n \leq 8$; phenols $C_6R_{(6-n)}(OH)_n$ in which $1 \leq n \leq 5$; polyols $CH_2X(CHX)_nCH_2X$, in which $X = H$ or OH but at least one $X = OH$ and $1 \leq n \leq 8$; anhydrides $RCH_2-C(O)-O-C(O)-CH_2R$; hydrosiloxanes $R_3Si-(O-SiR_2)_n-OSiR_3$, in which $0 \leq n \leq 8$, all wherein R is individually selected from the group consisting of hydrogen, normal, branched or cyclic C_{1-10} alkyl groups; and mixtures thereof, and (c) a free radical scavenger selected from the group consisting of 2,6-di-tert-butyl-4-methyl phenol, 2,2,6,6-tetramethyl-1-piperidinyloxy, 2-tert-butyl-4-hydroxyanisole, 3-tert-butyl-4-hydroxyanisole, propyl ester 3,4,5-trihydroxy-benzoic acid, 2-(1,1-dimethylethyl)-1,4-benzenediol, diphenylpicrylhydrazyl, 4-tert-butylcatechol, N-methylaniline, p-methoxydiphenylamine, diphenylamine, N,N'-diphenyl-p-phenylenediamine, p-hydroxydiphenylamine, phenol, octadecyl-3-(3,5-di-tert-butyl-4-hydroxyphenyl) propionate, tetrakis (methylene (3,5-di-tert-butyl)-4-hydroxy-hydrocinnamate) methane, phenothiazines, alkylamidonoisoureas, thiodiethylene bis (3,5-di-tert-butyl-4-hydroxy-hydrocinnamate, 1,2-bis (3,5-di-tert-butyl-4-hydroxyhydrocinnamoyl) hydrazine, tris (2-methyl-4-hydroxy-5-tert-butylphenyl) butane, cyclic neopentanetetrayl bis (octadecyl phosphite), 4,4'-thiobis (6-tert-butyl-m-cresol), 2,2'-methylenebis (6-tert-butyl-p-cresol), oxalyl bis (benzylidenehydrazide) and mixtures thereof.

22. A composition of 1,3,5,7-tetramethylcyclotetrasiloxane, used in a chemical vapor deposition process as a precursor for silicon oxides in electronic material fabrication, stabilized against polymerization, comprising 1,3,5,7-tetramethylcyclotetrasiloxane, and 2,4-pentanedione.

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23. A composition of 1,3,5,7-tetramethylcyclotetrasiloxane, used in a chemical vapor deposition process as a precursor for silicon oxides in electronic material fabrication, stabilized against polymerization, comprising 1,3,5,7-tetramethylcyclotetrasiloxane, and 1-hexanoic acid.

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24. A composition of 1,3,5,7-tetramethylcyclotetrasiloxane, used in a chemical vapor deposition process as a precursor for silicon oxides in electronic material fabrication, stabilized against polymerization, comprising 1,3,5,7-tetramethylcyclotetrasiloxane, and less than 1% (vol.) 1,1,1,5,5,5-hexamethyltrisiloxane.

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25. A composition of 1,3,5,7-tetramethylcyclotetrasiloxane, used in a chemical vapor deposition process as a precursor for silicon oxides in electronic material fabrication, stabilized against polymerization, comprising 1,3,5,7-tetramethylcyclotetrasiloxane, and glycerol.

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26. A composition of 1,3,5,7-tetramethylcyclotetrasiloxane, used in a chemical vapor deposition process as a precursor for silicon oxides in electronic material fabrication, stabilized against polymerization, comprising 1,3,5,7-tetramethylcyclotetrasiloxane, and acetic anhydride.

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27. A composition of 1,3,5,7-tetramethylcyclotetrasiloxane, used in a chemical vapor deposition process as a precursor for silicon oxides in electronic material fabrication, stabilized against polymerization, comprising 1,3,5,7-tetramethylcyclotetrasiloxane, 2,4-pentanedione and a free radical scavenger

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selected from the group consisting of 2,6-di-tert-butyl-4-methyl phenol, 2,2,6,6-tetramethyl-1-piperidinyloxy and mixtures thereof.

5 28. A composition of 1,3,5,7-tetramethylcyclotetrasiloxane, used in a chemical vapor deposition process as a precursor for silicon oxides in electronic material fabrication, stabilized against polymerization, comprising 1,3,5,7-tetramethylcyclotetrasiloxane, 1-hexanoic acid and a free radical scavenger selected from the group consisting of 2,6-di-tert-butyl-4-methyl phenol, 2,2,6,6-tetramethyl-1-piperidinyloxy and mixtures thereof.

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29. A composition of 1,3,5,7-tetramethylcyclotetrasiloxane, used in a chemical vapor deposition process as a precursor for silicon oxides in electronic material fabrication, stabilized against polymerization, comprising 1,3,5,7-tetramethylcyclotetrasiloxane, glycerol and a free radical scavenger selected from the group consisting of 2,6-di-tert-butyl-4-methyl phenol, 2,2,6,6-tetramethyl-1-piperidinyloxy and mixtures thereof.

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30. A composition of 1,3,5,7-tetramethylcyclotetrasiloxane, used in a chemical vapor deposition process as a precursor for silicon oxides in electronic material fabrication, stabilized against polymerization, comprising 1,3,5,7-tetramethylcyclotetrasiloxane, acetic anhydride and a free radical scavenger selected from the group consisting of 2,6-di-tert-butyl-4-methyl phenol, 2,2,6,6-tetramethyl-1-piperidinyloxy and mixtures thereof.

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